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ABSTRACT

Twenty-one standards are listed to serve as a guide for the evaluation of a school's mathematics program. The standards are grouped into four categories: (1) instruction; (2) the curriculum and instructional materials; (3) the teacher of mathematics; and (4) physical facilities and equipment. Questions following each standard provide a means by which strengths and needs of present programs may be clearly indicated. Included are sample forms that may be used to record and monitor progress toward a target. (MP)

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Standards for Successful Mathematics Programs

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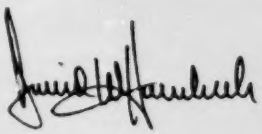
Foreword

Mathematics is one basic foundation of learning necessary for effectiveness as an adult. One cannot function successfully as a wage earner, citizen, or family member without the mastery of certain mathematical skills. The *Standards for Successful Mathematics Programs in Maryland* serve as a guide to a school in assessing its own program in this important discipline. The assessment will provide information indicating program strengths as well as indicating where redoubled efforts are necessary.

The Standards are the result of the hard work of many educators and citizens across the state. They serve as a tool by which school staffs may measure the effectiveness of current programs.



State Superintendent of Schools

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Introduction

Periodic review of any program is necessary to maintain quality. Accountability and the need to provide every assurance that young people acquire those basic skills so necessary to function effectively make it necessary to review carefully the mathematics programs in Maryland schools.

Accountability test scores are often used to measure success. These scores may or may not reflect the real success of a mathematics program. For example, a school with mathematically talented students may report high test scores yet the program may fall short of meeting these students' needs.

"Basic" mathematics is often considered computational skills, but a comprehensive mathematics program goes far beyond that definition. Maryland's goals for mathematics programs call for students to:

1. Recognize and recall mathematical facts, definitions, and symbols;
2. Perform mathematical manipulations;
3. Understand mathematical concepts and processes;
4. Solve specific mathematical problems;
5. Use mathematical reasoning and processes to meet personal and societal needs;
6. Appreciate and use mathematics.

To provide such a comprehensive mathematics program, the total school staff must be committed to:

1. Meeting the needs, abilities, interests, and capacities of each student;
2. Exhibiting positive attitudes toward mathematics;
3. Developing positive student attitudes toward mathematics;
4. Preparing students to use mathematics successfully in their future vocations, avocations, and leisure time.

PURPOSE

This document has been developed to serve as a guide for the evaluation of a school's mathematics program. The 21 Standards require the school staff to consider *all* aspects of the mathematics program. They provide a means by which strengths and needs of present programs are clearly indicated.

DEVELOPMENT

A committee was formed of 15 persons representing nine local education agencies, two colleges, and the Maryland State Department of Education. Teachers, principals, and supervisors, representing elementary, secondary, and higher education, were members.

The committee developed a working copy of Standards in four main categories — Instruction, Curriculum and Instructional Materials, The Teacher, and Physical Facilities and Equipment.

Nearly 500 copies of the working document were distributed to local education agencies and institutions of higher education for reactions and comments. Principals in several local education agencies actually used the Standards with their faculties. The 240 responses received were considered by the committee in the writing of the final document.

RESPONSIBILITIES

It will be the responsibility of the Maryland State Department of Education to devise and implement a plan to prepare administrative personnel in each local education agency, particularly principals, in the use of the document.

It will be the responsibility of each local education agency to participate in planned training and to assure the use of the Standards by *each* principal with his/her entire staff involved in instruction in mathematics.

Standards

The following Standards have been developed to assist principals and staff in the evaluation of school mathematics programs. *All* 21 Standards are attainable. Therefore, attainment of *all* 21 will indicate a successful mathematics program.

No attempt has been made to define "attained." The decision of whether the Standard is "attained" or "not attained" must be based on careful and thoughtful discussion, including documentation wherever possible, by all members of the school staff associated with mathematics instruction.

INSTRUCTION

STUDENT ACHIEVEMENT DEPENDS ON LONG-RANGE, SHORT-RANGE, AND DAILY PLANNING OF CLASSROOM ACTIVITIES BY THE TEACHER. THESE ACTIVITIES SHOULD BE AN OUTGROWTH OF INSTRUCTIONAL TECHNIQUES AND POLICIES AIMED TOWARD STUDENT ATTAINMENT OF CLEARLY DEFINED OBJECTIVES.

STANDARD 1 *Student attainment of clearly defined objectives is a primary goal of the instructional program.*

STANDARD 2 *Assessment devices are administered by the teacher and data obtained are utilized in planning instructional activities for individual students.*

STANDARD 3 *Instructional activities for students are based on their needs, interests, and abilities.*

STANDARD 4 *Teaching strategies are matched to the needs of the students and the nature of the objectives.*

STANDARD 5 *The classroom environment is conducive to the learning of mathematics.*

STANDARD 6 *Each teacher maintains and interprets appropriate records of student progress.*

STANDARD 7 *Instructional leadership and support are provided for teachers of mathematics.*

STANDARD 8 *Teachers are involved in the process of organizing for instruction.*

THE CURRICULUM AND INSTRUCTIONAL MATERIALS

CURRICULUM GUIDELINES AND INSTRUCTIONAL MATERIALS ARE A NECESSARY PART OF THE MATHEMATICS PROGRAM. PROGRAM GOALS AND MATERIALS SHOULD REFLECT THE NEEDS OF SOCIAL CHANGE.

STANDARD 9 *Appropriate mathematics curriculum and materials are provided for each student.*

STANDARD 10 *The mathematics program in each school is consistent with state and local goals and objectives.*

STANDARD 11 *An established procedure exists for evaluating school mathematics programs.*

STANDARD 12 *The content of the materials (including textbooks) selected to support the program is consistent with the objectives of the mathematics program and students' needs.*

STANDARD 13 *An established procedure exists for the evaluation and selection of mathematics instructional materials within the school.*

STANDARD 14 *Materials are matched with the instructional program to provide for their logical and practical classroom use.*

THE TEACHER OF MATHEMATICS

THE TEACHER OF MATHEMATICS IS THE MOST IMPORTANT COMPONENT OF ANY MATHEMATICS PROGRAM. THE TEACHER MUST HAVE KNOWLEDGE OF MATHEMATICS, UTILIZE A VARIETY OF TEACHING STYLES AND MATERIALS, AND DESIGN APPROPRIATE STRATEGIES TO FACILITATE THE MATHEMATICS EDUCATION OF STUDENTS. MOREOVER, TEACHERS OF MATHEMATICS MUST EXHIBIT POSITIVE ATTITUDES TOWARD MATHEMATICS, SHOW RESPECT FOR "LEARNERS," EXHIBIT ENTHUSIASM FOR TEACHING, AND HAVE A REALISTIC OPINION OF THEIR OWN COMPETENCIES.

STANDARD 15 *A qualified teacher of mathematics is assigned to teach each mathematics class.*

STANDARD 16 *The school administration is committed to continuing teacher education.*

STANDARD 17 *The needs, interests, and desires of teachers of mathematics are considered in preparing inservice education opportunities.*

STANDARD 18 *Teachers of mathematics seek opportunities for professional growth.*

STANDARD 19 *The evaluation of the effectiveness of the mathematics teacher is continuous.*

PHYSICAL FACILITIES AND EQUIPMENT

THE PHYSICAL FACILITIES OF SCHOOL BUILDINGS SHOULD PROMOTE OPTIMUM MATHEMATICS PERFORMANCE FROM EACH STUDENT. WHEN PLANNING A NEW OR RENOVATING AN EXISTING FACILITY, THE FOLLOWING CONSIDERATIONS SHOULD BE INCORPORATED INTO THE DESIGN PHASES OF THE TOTAL FACILITY. SUCCESS IN ADAPTING EXISTING BUILDINGS AND PROGRAMS WILL VARY, DEPENDING ON LOCAL CONDITIONS.

STANDARD 20 *The facility allows for sufficient instructional space for the mathematics program.*

STANDARD 21 *Equipment is provided for the mathematics program.*

Implementation

Appropriate questions, sufficiently specific and direct as to promote reflection and discussion, follow each Standard. The rating scale — E A I N — is to be used only as a record of the staff's response to each question. (E = excellent, A = adequate, I = inadequate, N = not applicable)

Each school should strive for a rating of "excellent" for *each* question, even though such ratings cannot always be attained because of constraints over which the school has little or no control. Cooperative planning should exist for the improvement in each area where the rating is "adequate" or "inadequate." Recognition that there is no perfect mathematics program is no reason to be satisfied with mediocrity or less.

INSTRUCTION

STANDARD 1

Student attainment of clearly defined objectives is a primary goal of the instructional program.

		Attained		Not Attained	
1.1	To what extent are objectives developed at the local level available to the teacher?	E	A	I	N
1.2	To what extent are lesson plans and actual class instruction based on objectives?	E	A	I	N
1.3	To what extent are assessment items appropriate for measuring the student attainment of the objectives?	E	A	I	N
1.4	What is the level of student awareness of the objectives of each lesson?	E	A	I	N
1.5	To what extent does the student assume responsibility for the attainment of the objectives?	E	A	I	N

STANDARD 2

Assessment devices are administered by the teacher and data obtained are utilized in planning instructional activities for individual students.

		Attained			Not Attained
2.1	To what extent are teachers aware of published diagnostic tests and locally developed diagnostic instruments as a means for assessing student attainment?	E	A	I	N
2.2	To what extent are teachers aware of informal diagnostic activities and conferences as a means for assessing student attainment?	E	A	I	N
2.3	What is the availability of appropriate diagnostic measures and tools?	E	A	I	N
2.4	To what extent are teachers assisted in interpreting results of and in utilizing a variety of assessment measures?	E	A	I	N
2.5	To what extent do teachers use diagnostic techniques for prescribing appropriate instructional activities for individual students?	E	A	I	N

STANDARD 3

	Instructional activities for students are based on their needs, interests, and abilities.	Attained			Not Attained
3.1	To what extent are the activities based on students' previous mathematical experiences?	E	A	I	N
3.2	How well are instructional activities planned to lead students from the concrete to the abstract?	E	A	I	N
3.3	To what extent do instructional activities regularly include problem solving involving mathematical applications meaningful to students?	E	A	I	N
3.4	To what extent are available manipulative materials used by students in learning activities?	E	A	I	N

STANDARD 4

Teaching strategies are matched to the needs of the students and the nature of the objectives.	Attained			Not Attained
4.1 To what extent do teaching practices include large-group, small-group, and/or individualized instruction as appropriate to each lesson?	E	A	I	N
4.2 To what extent are students appropriately involved in a variety of activities?	E	A	I	N
4.3 To what extent is the pacing of each lesson matched with the students and the content?	E	A	I	N
4.4 To what extent are manipulative and other instructional materials incorporated in the prescription of learning activities?	E	A	I	N
4.5 To what extent do teachers provide for proper motivation?	E	A	I	N
4.6 To what extent do teachers employ teaching styles compatible with students learning styles?	E	A	I	N

STANDARD 5

The classroom environment is conducive to the learning of mathematics.	Attained			Not Attained
5.1 To what extent does the teacher create a positive learning environment?	E	A	I	N
5.2 To what extent does the teacher use the physical environment to complement instruction?	E	A	I	N

STANDARD 6

Each teacher maintains and interprets appropriate records of student progress.	Attained			Not Attained
6.1 To what extent does each teacher use an acceptable method for recording student progress?	E	A	I	N

6.2 To what extent do teachers of mathematics provide consistent evaluation and interpretation of student progress? E A I N

6.3 How effective is the communication of student progress to students and parents? E A I N

STANDARD 7

Instructional leadership and support are provided for teachers of mathematics. Attained / Not Attained

7.1 To what extent does the principal provide instructional leadership and support for the mathematics program? E A I N

7.2 To what extent has consideration been given to designating a member of the school staff for in-school support of the mathematics teachers? E A I N

7.3 How effective is communication between teachers of mathematics and counselors in advising students in program decisions? E A I N

7.4 To what extent are volunteers and paraprofessionals used to assist with the implementation of the mathematics program? E A I N

STANDARD 8

Teachers are involved in the process of organizing for instruction. Attained / Not Attained

8.1 To what extent are teachers consulted in planning instructional schedules? E A I N

8.2 To what degree has provision been made for sharing among teachers; i.e., meetings for discussion of teaching concerns and techniques, conferences on the needs of individual students, program planning, and interdisciplinary planning? E A I N

8.3 To what extent is appropriate mathematics instruction provided for each student on a daily basis? E A I N

THE CURRICULUM AND INSTRUCTIONAL MATERIALS

STANDARD 9

	Appropriate mathematics curriculum and materials are provided for each student.	Attained			Not Attained
9.1	What provisions are made for all students?	E	A	I	N
9.2	What provisions are made for gifted and talented students?	E	A	I	N
9.3	What provisions are made for remedial instruction where needed?	E	A	I	N
9.4	What provisions are made for handicapped students?	E	A	I	N
9.5	What provisions are made for disadvantaged students who qualify under Title I, Elementary and Secondary Education Act?	E	A	I	N
9.6	To what extent are special services available to teachers of mathematics (such as referral services, resource teachers, consultants)?	E	A	I	N

STANDARD 10

	The mathematics program in each school is consistent with state and local goals and objectives.	Attained			Not Attained
10.1	To what extent are there system-approved curriculum guides available for each mathematics teacher in the school?	E	A	I	N
10.2	To what extent are there approved mathematics course guides available for each course offered within the school?	E	A	I	N
10.3	To what extent are the guides current and consistent with state and local goals and objectives?	E	A	I	N

		Attained			Not Attained
10.4	To what extent have the following groups been involved in developing local mathematics programs:				
10.4.1	Staff?	E	A	I	N
10.4.2	Members of the community?	E	A	I	N
10.4.3	School system consultants?	E	A	I	N
10.4.4	Outside the system consultants?	E	A	I	N
10.5	To what extent are the local curriculum guides understood and followed?	E	A	I	N

STANDARD 11

	An established procedure exists for evaluating school mathematics programs.	Attained			Not Attained
11.1	To what extent have procedures been established to evaluate the effectiveness of the mathematics program?	E	A	I	N
11.2	To what extent are these procedures periodically applied?	E	A	I	N
11.3	To what extent are the evaluative results used to modify the mathematics program?	E	A	I	N

STANDARD 12

	The content of the materials (including textbooks) selected to support the program is consistent with the objectives of the mathematics program and students' needs.	Attained			Not Attained
12.1	To what extent is the content mathematically sound?	E	A	I	N
12.2	To what extent is the level of the content appropriate for the identified group?	E	A	I	N
12.3	To what extent are there meaningful applications within the mathematics program content?	E	A	I	N
12.4	To what extent does the mathematics program reflect current topics in mathematics education?	E	A	I	N

STANDARD 13

An established procedure exists for the evaluation and selection of mathematics instructional materials within the school.

Attained / Not Attained

13.1 To what extent have procedures been established to evaluate textbooks and other printed material in accordance with state guidelines? E A I N

13.2 To what extent are established procedures used to evaluate and select supplementary instructional materials? E A I N

13.3 To what extent are provisions made for teachers to participate in the evaluation of materials? E A I N

13.4 To what extent are provisions made for teachers to become familiar with the selected materials before using them with their students? E A I N

13.5 To what extent does the staff work with the media specialists in selecting materials in mathematics for the media center? E A I N

STANDARD 14

Materials are matched with the instructional program to provide for their logical and practical classroom use.

Attained / Not Attained

14.1 To what extent is an inventory of available mathematics materials provided for teachers? E A I N

14.2 To what extent are the materials organized for easy retrieval? E A I N

14.3 To what extent are the materials easily accessible to the teacher? E A I N

14.4 To what extent are the materials periodically reviewed and updated? E A I N

14.5 To what extent is a variety of materials available and matched with the instructional program? E A I N

THE TEACHER OF MATHEMATICS

STANDARD 15

	A qualified teacher of mathematics is assigned to teach each mathematics class.	Attained			Not Attained
15.1	To what extent do teachers of mathematics meet the current Maryland requirements for certificates?	E	A	I	N
15.2	How much progress has been made in the development of plans to encourage teachers to meet current Maryland requirements for certificates?	E	A	I	N

STANDARD 16

	The school administration is committed to continuing teacher education.	Attained			Not Attained
16.1	To what extent are teachers of mathematics encouraged to participate in mathematics workshops, meetings, institutes, and conferences?	E	A	I	N
16.2	To what extent are teachers of mathematics encouraged to participate in inservice programs?	E	A	I	N
16.3	To what extent are teachers of mathematics encouraged to enroll in college-level courses?	E	A	I	N
16.4	To what extent are teachers of mathematics encouraged to observe other mathematics classes?	E	A	I	N
16.5	To what extent are summaries of relevant current research made available to teachers of mathematics?	E	A	I	N

STANDARD 17

	The needs, interests, and desires of teachers of mathematics are considered in preparing inservice education opportunities.	Attained			Not Attained
17.1	To what extent are teachers surveyed to determine their needs and desires in the area of inservice education?	E	A	I	N

		Attained			Not Attained
17.2	To what extent are teachers involved in the planning of inservice education opportunities?	E	A	I	N
17.3	To what extent are inservice activities preparing teachers to teach current topics in mathematics?	E	A	I	N
17.4	To what extent are inservice activities helping teachers utilize available instructional materials, facilities, and equipment?	E	A	I	N
17.5	To what extent have provisions been made for evaluation and follow-up of inservice activities?	E	A	I	N

STANDARD 18

	Teachers of mathematics seek opportunities for professional growth.	Attained			Not Attained
18.1	To what extent do teachers of mathematics participate in ongoing mathematics inservice programs and/or college-level programs?	E	A	I	N
18.2	To what extent do teachers of mathematics participate in the activities of professional mathematics organizations?	E	A	I	N
18.3	To what extent do teachers of mathematics participate in mathematics workshops, meetings, institutes, and conferences?	E	A	I	N
18.4	To what extent do teachers of mathematics observe other mathematics classes?	E	A	I	N
18.5	To what extent are publications and materials from professional mathematics organizations available in the school to teachers of mathematics?	E	A	I	N
18.6	To what extent do teachers of mathematics read and use publications and materials from professional mathematics organizations?	E	A	I	N

STANDARD 19

	The evaluation of the effectiveness of the mathematics teacher is continuous.	Attained			Not Attained
19.1	To what extent does evaluation help teachers identify their strengths and mathematical competencies?	E	A	I	N
19.2	To what extent does each teacher of mathematics plan and implement a program for self-improvement?	E	A	I	N

PHYSICAL FACILITIES AND EQUIPMENT

STANDARD 20

	The facility allows for sufficient instructional space for the mathematics program.	Attained			Not Attained
20.1	To what extent are instructional areas provided for large-group, small-group, and individualized instruction?	E	A	I	N
20.2	How well are students with special physical and/or instructional needs provided for within the facility?	E	A	I	N
20.3	To what extent are mathematics resource areas available and convenient within the facility for both students and teachers?	E	A	I	N
20.4	If a mathematics lab exists within the school, to what extent does it allow for a variety of activities?	E	A	I	N
20.5	To what extent do the staff areas allow for both individual and group planning and preparation?	E	A	I	N
20.6	To what extent is consideration given to the visual, climatic, and acoustical aspects of mathematics areas?	E	A	I	N

20.7 To what extent are provisions made for mathematical displays? E A I N

20.8 To what extent is consideration given to teacher input in the planning of new or renovated facilities? E A I N

STANDARD 21

Equipment is provided for the mathematics program.

Attained / Not Attained

21.1 To what extent is sufficient equipment provided to support the mathematics program; i.e., chalkboards, bulletin boards, calculators, overhead projectors, duplicating equipment? E A I N

21.2 To what extent is appropriate equipment provided for students with special physical and/or instructional needs in mathematics? E A I N

21.3 To what extent do equipment storage areas exist which are sufficient, accessible, and secure? E A I N

21.4 To what extent are provisions made for transporting equipment throughout the facility? E A I N

21.5 To what extent are provisions made for the installation and use of computers, instructional television, and electrical outlets when appropriate? E A I N

Samples

By utilizing these Standards and related questions, target areas for program improvement in mathematics can be identified. The mathematics staff should cooperatively set priorities in the target areas.

The following are forms that may be used to record and monitor progress toward a target. The forms involve hypothetical examples. Use of these forms for assessing the mathematics program is strictly an option of the local school.

SAMPLE SCHOOL LEVEL MATHEMATICS TARGETS FORM

Based on a careful analysis of the *Standards for Successful Mathematics Programs,* the staff at _____ School has formulated the following school mathematics targets for the 19__-19__ School Year.

Target #1 — By the end of the _____ School Year, each mathematics teacher will have received an inventory of mathematics instructional materials available within the school.

Target #2 — By September 30, ____, a mathematics resource center for students and teachers will have been established in an easily accessible area. The area will contain teacher guides, mathematics books, games, manipulatives, etc.

Teachers: _____

_____

_____

Principal: _____

Date: _____

SAMPLE SCHOOL LEVEL TARGET MONITORING FORM

Target #2 — By September 30, _____, a mathematics resource center for students and teachers will have been established in an easily accessible area. The area will contain teacher guides, mathematics books, games, manipulatives, etc.

_____

_____-Month Progress Check

Little or No Progress	Some Progress	Good Progress	Target Attained

Comments:

_____

_____-Month Progress Check

Little or No Progress	Some Progress	Good Progress	Target Attained

Comments:

Teachers: _____

_____

_____

Principal: _____

Appendix

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